Subject:	INFORMATION: Policy regarding flight control jams for "normally encountered positions" § 25.671(c)(3)	date:	May 3, 1995
From:	Manager, Transport Airplane Directorate Aircraft Certification Service, ANM-100	Reply to Attn. of:	ANM-112
To:	Managers, ANM-100S, -100L, ASW-100, ACE-115A, ACE-115W, ACE-100, ANE-100		

The Transport Directorate is standardizing the criteria used in demonstrating compliance with § 25.671(c)(3). Section 25.671(c) states that the airplane must be shown by analysis, tests, or both, to be capable of continued safe flight and landing after any of the following failures or jamming in the flight control system and surfaces (including trim, lift, drag, and feel systems), within the normal flight envelope, without requiring exceptional piloting skill or strength. Subparagraph (c)(3) of this section specifies any jam in a control position normally encountered during takeoff, climb, cruise, normal turns, descent, and landing unless the jam is shown to be extremely improbable, or can be alleviated. This policy memorandum establishes the control surface positions normally encountered during takeoff, flight, and landing, and should only be used for determining the control surface jam positions considered under the first sentence of subparagraph (c)(3). It does not address airplane handling qualities in the jammed condition.

The applicants have generally been unable to demonstrate that a flight control jam in a position normally encountered is extremely improbable. Therefore, they must show the airplane is controllable with a jam. The regulation intended that control surface movement would be in that range associated with normal flight. For example, the range of elevator positions used for rotation and maneuvering during a normal flight, or the range of rudder positions used in normal takeoff and flight, including lateral gust conditions.

In the absence of more rational data the following criteria should be used to define the control surface jam positions. The control surface deflections associated with the following conditions should be based on the maximum deflections developed during initiation of the maneuver and during recovery from the maneuver. Controllability should be demonstrated in the jammed condition for all approved airplane gross weights and c.g. locations. For the purpose of establishing control positions normally encountered throughout the flight, only the airplane rigid body modes need to be considered when evaluating the airplane response to either maneuvers or gusts. The pilot response, as well as any automatic system response, should also be evaluated for these conditions. It is not necessary to consider additional failures when evaluating the jam condition.

Jammed elevator positions:

- Takeoff run nose down elevator
- Takeoff rotation
- Normal maneuvers to 1 +/- 0.3g
- Vertical gusts to 25 fps from S.L. to 20,000 feet.

Jammed rudder positions:

- Limit of yaw damper control authority

Lateral gust to 25 fps from S.L. to 20,000 feet.
Cross winds to 20 kts. in the landing configuration.

Jammed aileron and roll control spoiler positions:

Deflections associated with the following roll rates:

7 deg/sec for wide-body airplanes
9 deg/sec for narrow-body airplanes
12 deg/sec for business class airplanes

Vertical and lateral gusts to 25 fps from S.L. to 20,000 feet.

Control surface servo tabs installed on floating control surfaces are assumed jammed in the positions associated with the control surface deflections on which they are installed

Trim tabs and movable stabilizers are assumed jammed in the position normally selected for takeoff, landing, and normally used throughout the flight to maintain the airplane in the trimmed conditions.

Speed brake panels are assumed to jam in any position for which they are approved to operate during flight.

Flaps and slats are assumed to jam in any position used for takeoff, approach, and landing as well as in the fully retracted position. Section 25.701 addresses the asymmetrical jam conditions for which these devices must be designed.

For continuation of the flight, with the control surface in the jammed position, the airplane must be able to land in a 10 kts cross wind and be able to maneuver within 0.9 to 1.3 gs. The airplane structure must be capable of withstanding the discrete source damage loads (get home loads) defined in AC 25.571-1A, Damage-Tolerance and Fatigue Evaluation of Structure.

Please bring this information to the attention of the transport category airplane manufacturers and the appropriate designated engineering representatives in your geographical area of responsibility.

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